Missouri Department of Natural Resources

Total Maximum Daily Load Information Sheet

Indian Creek (and Tributary) and Courtois Creek

Water Body Segments at a Glance:

County(ies): Washington, Crawford and Iron

Nearby Cities: Viburnum

Length of Segments:
Indian Creek – 1.5 miles
Tributary to Indian Creek – 0.3 miles
Courtois Creek – 30 miles

Pollutants: Lead and Zinc

Source: Drainage from Viburnum Division lead mine tailings piles and mining area

Water Body ID:
Indian Creek – 1946
Tributary to Indian Creek – 3663
Courtois Creek - 1943

State map showing location of watershed

TMDL Priority Ranking: High
Scheduled for TMDL Development: 2009

Description of the Problem

Designated beneficial uses

- Livestock and wildlife watering
- Protection of human health (fish consumption)
- Whole body contact recreation
- Secondary contact recreation (Courtois Creek)
- Protection of warm-water aquatic life (Indian Creek and tributary)
- Protection of cool-water aquatic life (Courtois Creek)

Uses that are impaired

- Protection of warm-water aquatic life (Indian Creek and tributary)
- Protection of cool-water aquatic life (Courtois Creek)

Standards that apply

Missouri water quality criteria for metals found in 10 CSR 20-7.031(4)(B)1 state:

> Water contaminants shall not cause the criteria in Tables A and B to be exceeded. Concentrations of these substances in bottom sediments or waters shall not harm

benthic organisms and shall not accumulate through the food chain in harmful concentrations, nor shall state and federal maximum fish tissue levels for fish consumption be exceeded.

In addition, Table A of Missouri's water quality standards, expresses current lead and zinc criteria for the protection of aquatic life in dissolved form. These criteria are hardness dependent and are calculated from the formulas shown below with results expressed in micrograms per liter, or µg/L.

Dissolved Lead

Acute = $e^{(1.273*\ln(\text{hardness})-1.460448)}*(1.46203-(\ln(\text{hardness})*0.145712))$ = µg/L

Chronic = $e^{(1.273*\ln(\text{hardness})-4.704797)}*(1.46203-(\ln(\text{hardness})*0.145712))$ = µg/L

Dissolved Zinc

Chronic = $e^{(0.8473*\ln(\text{hardness})+0.785)} * 0.978$ = µg/L

Acute = $e^{(0.8473*\ln(\text{hardness})+0.8842)} * 0.986$ = µg/L

Where e (~2.718) is the base of the natural logarithm and "ln" is the natural logarithm.

Background Information

Indian Creek, Tributary to Indian Creek, and Courtois Creek[1] are listed as impaired in Missouri's U.S. Environmental Protection Agency approved 2004/2006 303(d) list of impaired waters for lead and zinc. This listing is a result of water quality data from the creeks that show exceedances of the dissolved lead and dissolved zinc chronic criteria. Additionally, these streams' aquatic invertebrate communities[2] are exhibiting reduced species diversity and fewer individuals compared to reference streams. These reductions indicate these animals are being adversely affected by something in their environment.

It is common to find lead and zinc contamination in soil, groundwater, surface water and sediments surrounding lead and zinc mines. In excess quantities, both lead and zinc can be highly toxic to aquatic life. In addition, human consumption of fish containing sufficient quantities of lead can result in health problems, primarily affecting the nervous system, blood cells, and processes for the metabolism of Vitamin D and calcium.

The impaired portions of Indian Creek, Tributary to Indian Creek, and Courtois Creek are located near the *New Lead Belt* region of southeast Missouri. This area is also referred to as the Viburnum Trend. Today, the only active mine in this area is the Doe Run Company-Viburnum Division, which has several outfalls that discharge into Indian Creek. Within the mining area are two large mine tailings impoundments covering a total area greater than 800 acres, which drain to these creeks.

Water Quality Assessment Data

Following are graphic summaries of the lead and zinc data from 2001-2005 for Indian Creek, Tributary to Indian Creek, and Courtois Creek (Figures 1 – 6). The chronic criteria for both dissolved lead and dissolved zinc were calculated using the 25th percentile hardness values. These

[1] Courtois Creek is pronounced locally as "Code-away Creek"

[2] Organisms without backbones that live in the stream and support the food chain

data, along with studies of the streams' aquatic invertebrate communities, were used for assessing the streams' impairment.

Figure 1.

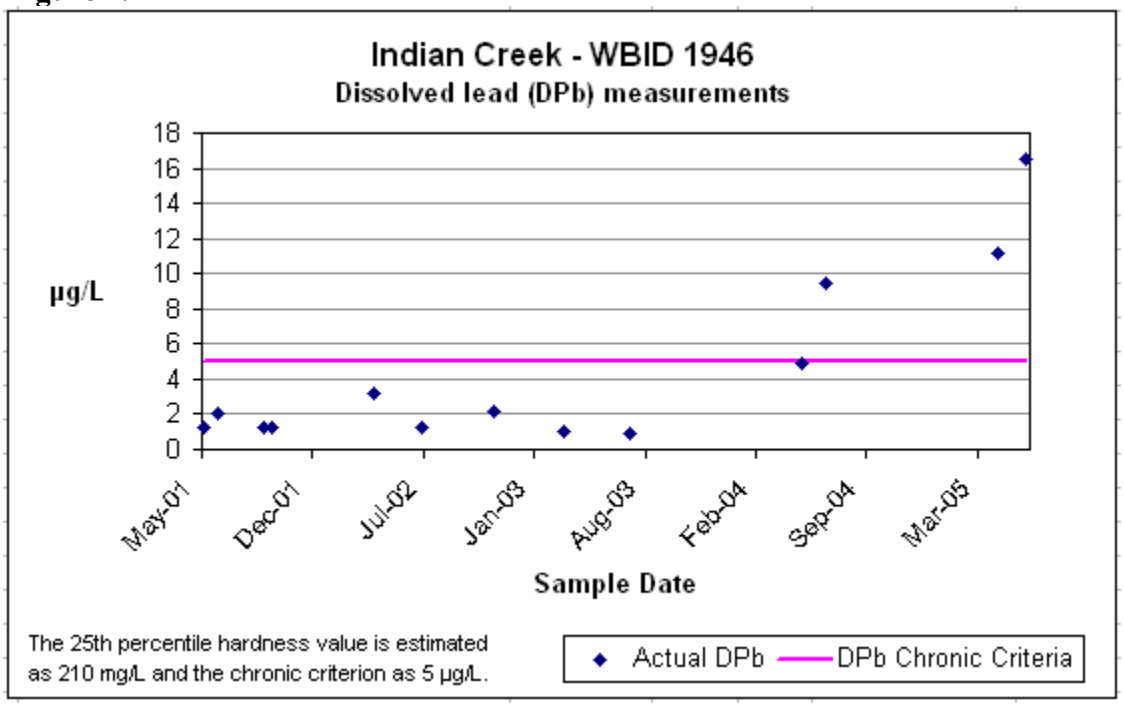


Figure 2.

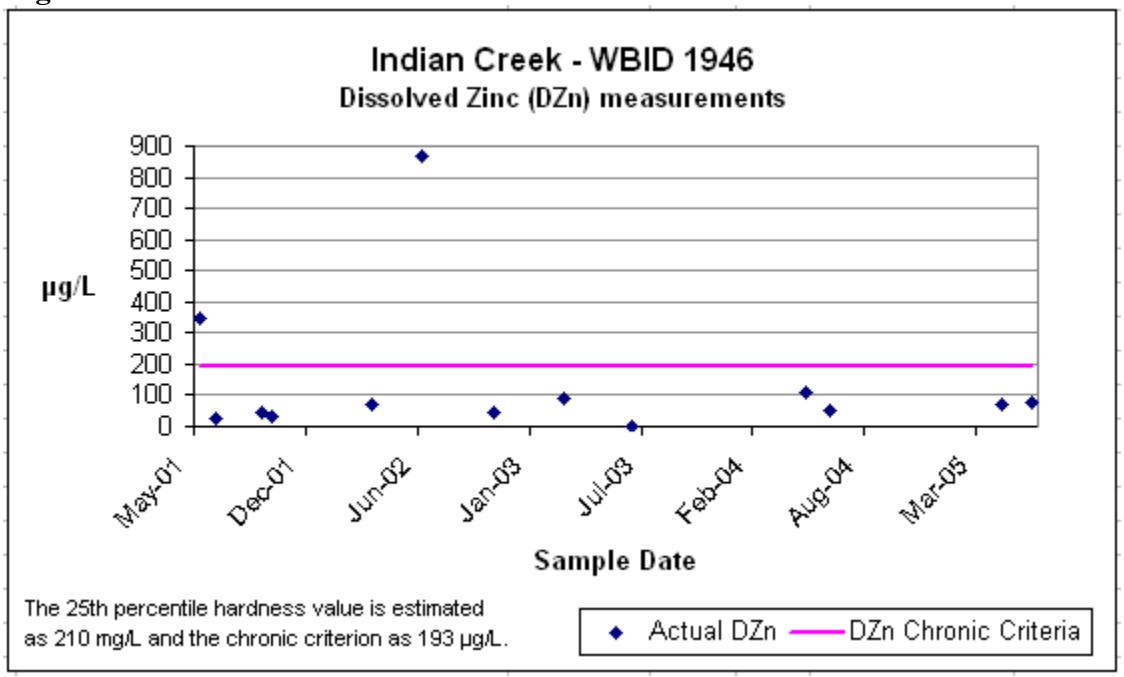


Figure 3.

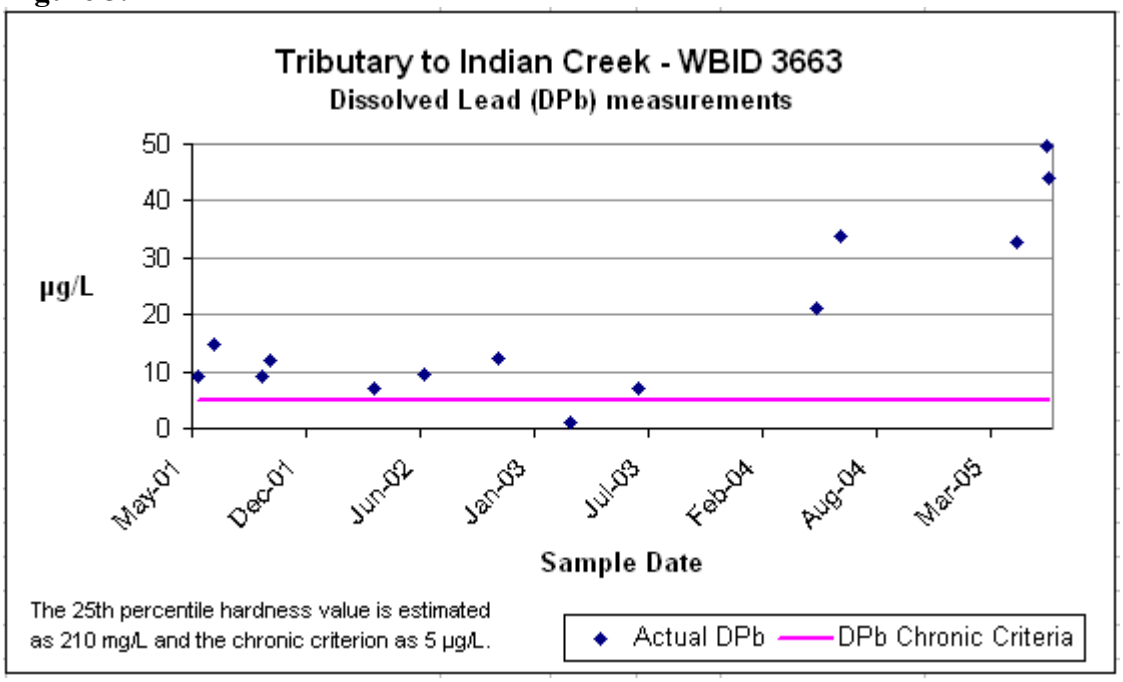


Figure 4.

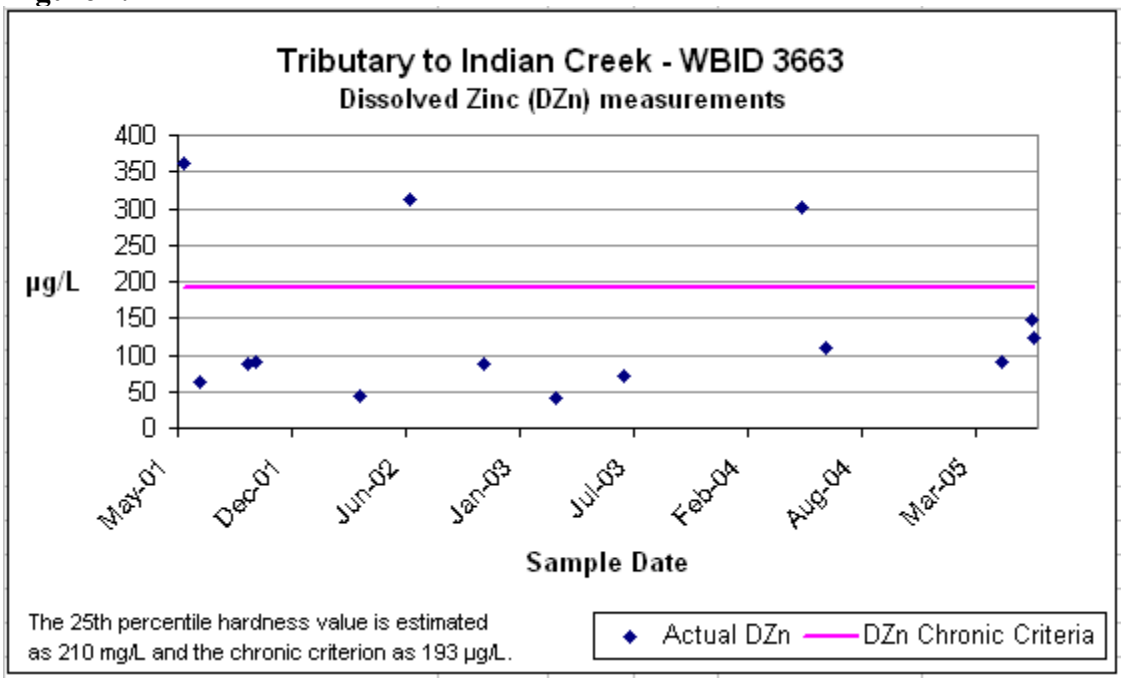


Figure 5.

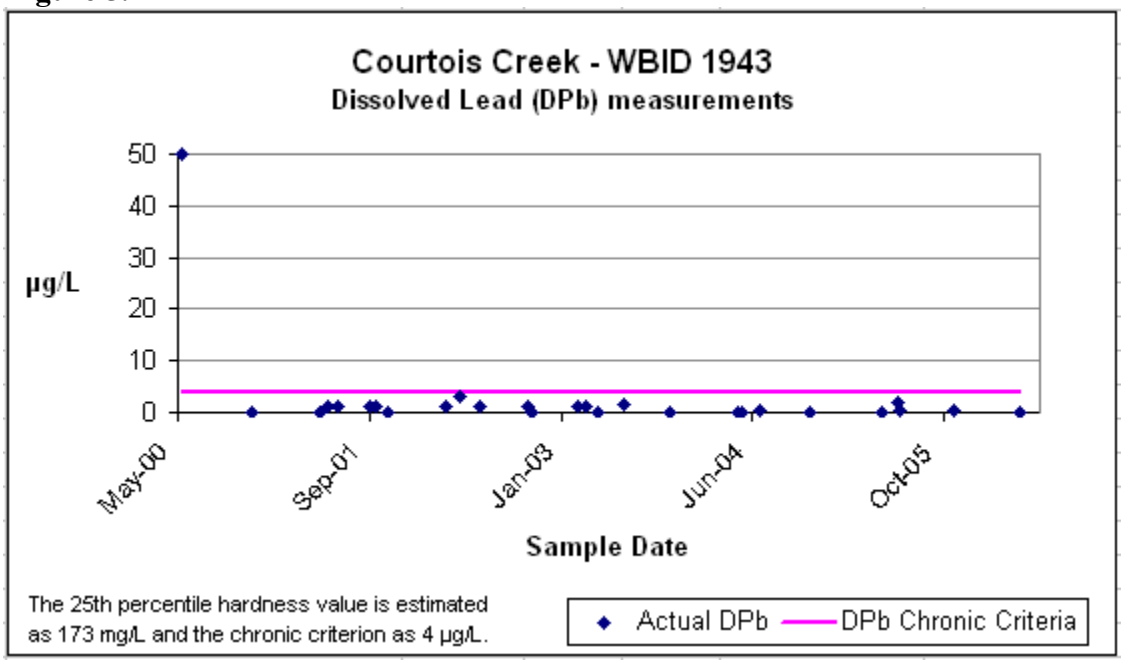


Figure 6.

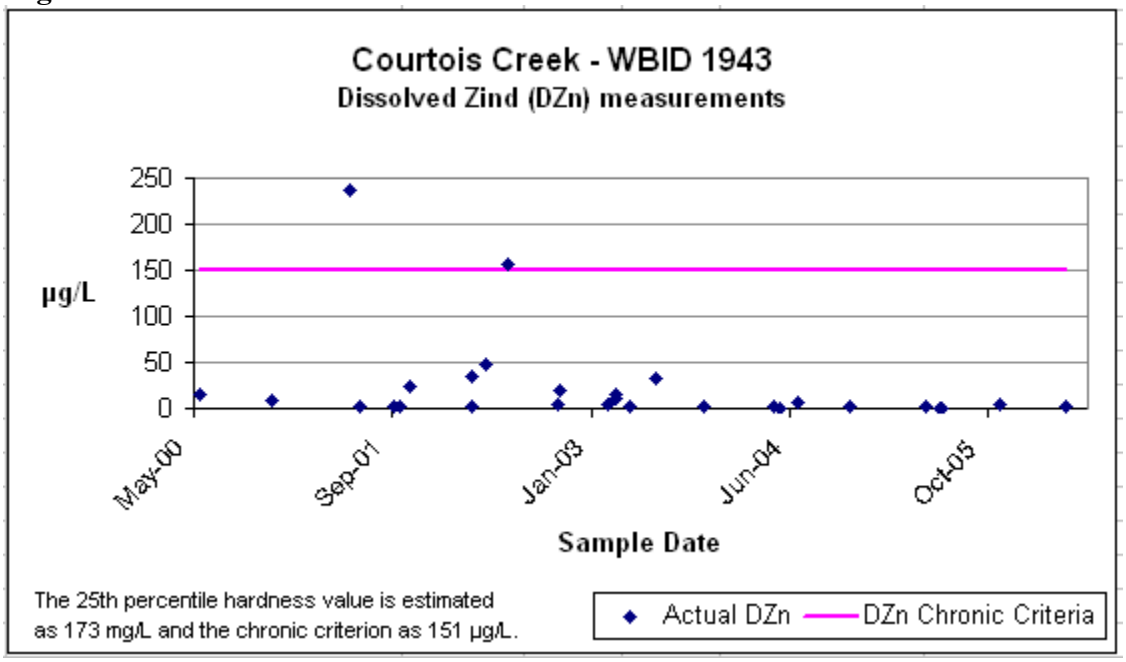
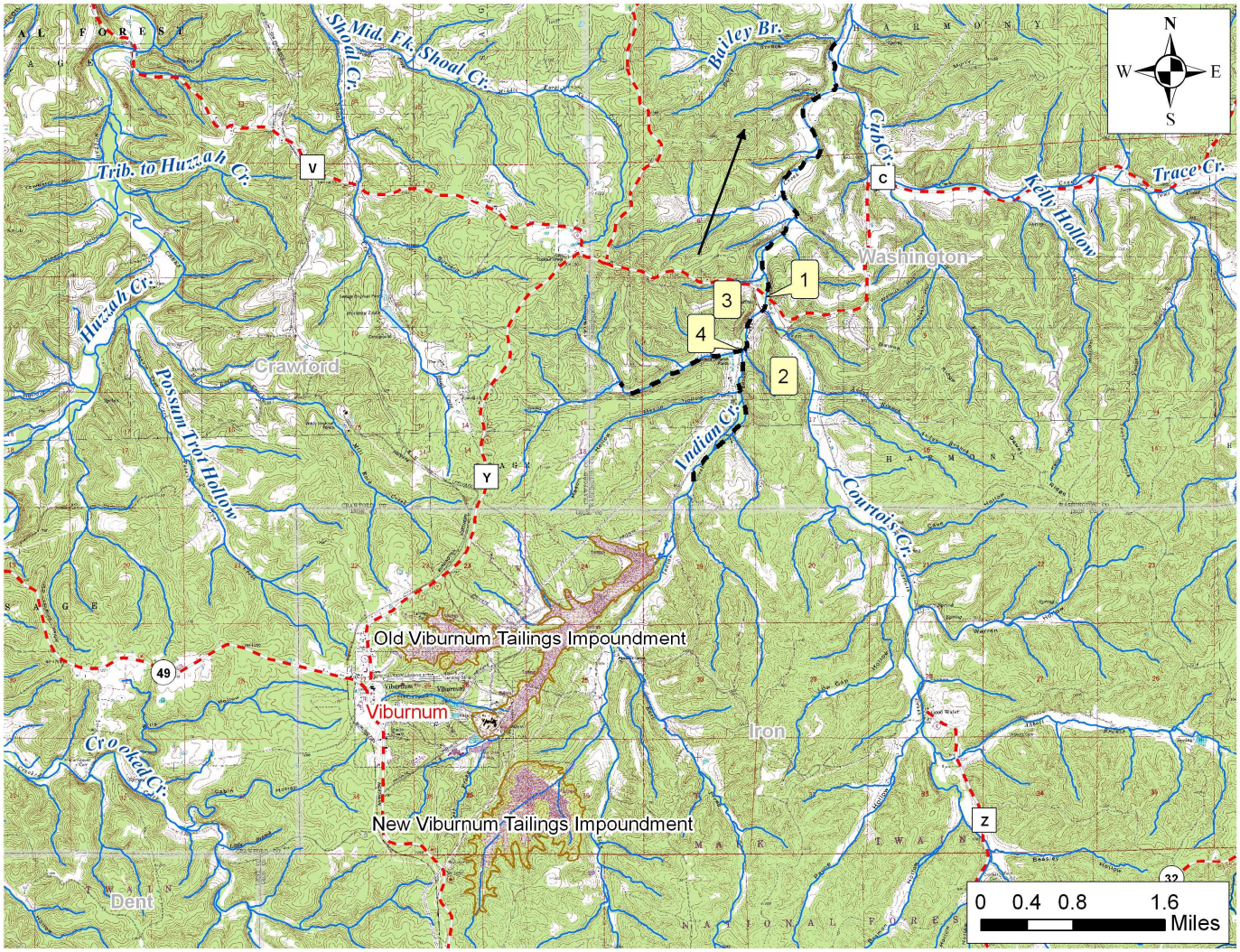


Figure 7.
Impaired Segments of Indian Creek, Tributary to Indian Creek and Courtois Creeks in Washington County, Mo with Sampling Sites



Impaired Segment Direction of flow

Sample Sites
1 – Courtois Creek downstream of Indian Creek
2 – Courtois Creek upstream of Indian Creek
3 – Indian Creek at old Highway C
4 – Tributary to Indian Creek

For more information call or write:
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